CLAIMS

1. A process to damp and filter the amplitude of mechanically-originated vibrations of a structure to be uncoupled, ***wherein*** the incident vibratory wave is filtered associated with damping, by providing absorption of the filtered vibratory wave transmitted to the structure over a very wide very wide band of frequency and mechanical load amplitude applied to said structure.

2. A damping and filtering process according to Claim 1, wherein it associates a series suspension in the form of a suspension assembly mounted in series between two elements of the structure with a damping device mounted in parallel to the suspension.

3. A damping and filtering process according to Claims 1 or 2, wherein the damping device is of the parallel type and has an internal geometry able to provide a deflection, and if required also an amplification and location of the vibrations to ensure damping of the vibratory response of said structure, and wherein the series suspension at the same time has a sufficiently rigid static support function, and dynamic filtering functions with variable characteristics depending on the level of the load to be applied to the structure.

4. A device to filter and damp the vibrations between a first element (1) subjected to an incident vibratory wave and a second element (2) radiating a filtered vibratory wave, wherein it comprises an interface structure (10) to transfer vibratory energy constituted by at least one elastic component (1) and at least one dissipative component (7) attached in parallel to the elastic component to ensure the filtration and damping of the incident vibratory wave.

5. A filtering and damping device according to Claim 4, wherein the dissipative component (7) is constituted by two separate rigid frames (4, 5) ensuring, punctually or continuously, deflection functions, if required, by a lever arm effect, amplification of the vibratory energies generated by the elastic components (1) towards a dissipative material (6) positioned between them, said dissipative component (6) providing damping for the elastic component.

6. A filtering and damping device according to Claims 4, wherein the dissipative component (7) has a lineic profile and is constituted by an assembly of rigid aligned frames (4, 5), attached by their bases to the elastic components (1), or to any other vibrating structure, and independent of one another such that their relative movements, corresponding to an amplification by lever arm effect of the vibratory response of the elastic component, are transmitted by their ends to a dissipative material (6) onto which a continuous or discontinuous stress plate is mounted to transfer the vibratory energy to the frame assembly (4,5).

7. A filtering and damping device according to Claim 4, wherein the dissipative component (7) of surface profile is constituted by and element (50), of adapted stiffness, isotropic or not, continuous or not, rigidly attached at one side to the component (1), or to any other vibrating structure, such that the vibratory waves, deflected, located and amplified by its internal structure, are transmitted, by its upper face, to a dissipative material (6), itself stressed on its upper face by a continuous or locally discontinuous plate (27) able to ensure the transfer via the dissipative material of vibratory energies respectively towards the assembly or an assembly of frames (50).

8. A filtering and damping device according to Claim 4, wherein the dissipative component (7) is rotational and constituted by an assembly of rigid frames (22), spaced cyclically or not around a central part (9), attached rigidly or not at one end to the elastic component (1) or to any other vibratory structure, and free at the other end so that the relative movements of these frames are transmitted to dissipative materials (25), and attached at the other end to a continuous or discontinuous stressed plate (27) able, through the dissipative materials, to ensure the retention of the frame assembly (2).

9. A filtering and damping device according to Claim 4, wherein the elastic component (1) comprises an assembly of two rotational sub-assemblies (12, 13) having a continuous or discontinuous evolutive profile of the elastic leaf spring

type (14, 16), at least one of whose ends (17) has an evolutive contact surface, the assembly being completed by a zone (15) in which the dissipative materials (6) are inserted.

10. A filtering and damping device according to Claim 9, wherein the elastic leaf springs (14, 16) have a potentially non-linear stiffness conferred by their evolutive geometric profile to ensure a gradual contact of the leaf spring (16) with the matching profile (18) of the other leaf spring (14), to ensure an evolutive filtering frequency and controlled relative motion space of the leaves according to the dynamic load applied.

11. A filtering and damping device according to Claim 4, wherein the interface structure is rotational or not and is composed of an elastic leaf spring (31) rigidly connected to the element (3) and an elastic leaf spring (32) rigidly connected to the element (2), the springs being connected together at their free ends and wound around a ring (30), elastic or not, by means of layers of dissipative materials (6), and coming into direct contact according to the dynamic load applied to ensure the non-linear filtering and damping function.

12. A filtering and damping device according to Claim 11, wherein the elastic leaf springs (31, 32) have a potentially non-linear stiffness thanks to their evolutive geometric profile and by the gradual contact between the leaf springs (31, 32) whose profiles reciprocally match their respective admissible maximal deformation, to ensure, depending on the dynamic load applied, evolutive frequency and a controlled or even limited relative motion space of the elements.

13. A filtering and damping device according to Claims 4 to 12, wherein the dissipative material (6) converts the vibratory energy into another form of energy, for example heat energy by friction between materials or with viscoelastic materials, electrical energy with piezoelectric materials, magnetic energy with magnetostrictive materials, or any other form of energy.

14. A filtering and damping device according to Claims 4 to 12, wherein the elastic component (1) has at least two dimensions and may be formed by assemblies of beams, straight or curved bars, solid volumes, plane plates or more complex shapes and wherein its elastic properties stem from elastic materials, metallic or not, homogeneous or not, isotropic or anisotropic.

15. A filtering and damping device according to Claim 7, wherein the element (50) constituting the dissipative component (7) of surface profile, integrates the properties of thermal and acoustic insulation, such as for example cellular foam, or cork-based composites, enabling the dissipative component (7) to preserve damping efficiency over a wide temperature range and to possess, in addition, the intrinsic performances of an acoustic screen and thermal insulator.